

REMARKS

Claims 1 through 9 are currently pending in the application.

Claim 1 has been amended.

This amendment is in response to the final Office Action of October 8, 2003.

35 U.S.C. § 103(a) Rejections

Obviousness Rejection Based on Watts, Jr. et al. (U.S. Patent 6,276,589)

Claims 1 through 3 and 6 through 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Watts, Jr. et al. (U.S. Patent 6,276,589). Applicant respectfully traverses this rejection, as hereinafter set forth.

Applicant further submits that to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. Applicant's claims as amended violate all three of the above criteria.

In the Office Action, it is argued that it would be obvious to simply extend the one dimensional deflection method of Watts by adding a second pair of deflection plates, and thereby gain a controlled deflection in an additional dimension. This point is made abundantly clear in the text of the Office Action, page five, first full paragraph; page seven, second full paragraph; and page eight, first full paragraph. At page three of the Office Action, it is stated that the addition of a second pair of deflection plates "merely a duplication of parts. The practitioner would allegedly thus arrive at Applicant's invention, which requires "selectively deflecting" the solder droplets in two dimensions. See claim 1. (Watts actually teaches a method for applying solder which gains a second dimension of controllability by moving the table, in the dimension perpendicular to the deflection direction, which supports the surface to which the solder is being

applied. Applicant assumes that the rationale of the Office Action is suggesting the replacement of the table with a pair of deflection plates.)

However, the method of Watts differs from Applicant's presently claimed method in at least one crucial way: the method by which the deflection of the falling solder droplets is accomplished. Watts controls the direction of falling solder droplets by controlling the charge on the droplet. See column four, lines 25 through 30 of Watts where it is stated that "[t]he charge on each droplet controls whether the solder droplet 14 is passed undeflected toward the substrate along the y-axis while the table is moved along the x-axis. The magnitude of the charge determines the extent of deflection along the y-axis."

Applicant, in contrast, controls the deflection of the solder droplet by varying the electric field between the deflection plates. Please see Applicant's specification at paragraph [0020] where it states the following: "Signal controller 34 can be programmed to perform a variety of soldering patterns for placing droplets 14 on substrate 12. For example, a CAD/CAM system programmed with a desired output sends signals to ... deflection plates 36 to guide the droplet stream in the desired pattern of placing droplets in certain locations, but not in others."

Applicant has amended claim 1 to include the charging of drops.

Because Watts teaches deflection by variation of droplet charge, the practitioner cannot extend the teachings of Watts to arrive at Applicant's invention. If Watts is modified by substituting an additional pair of deflection plates for the moving table, one of ordinary skill in the art will actually *lose* the ability to deposit solder over the entirety of the x-y two dimensional plane. It should be evident that for a given pair of potentials (one corresponding to the x deflection, the other corresponding to the y deflection) a set of droplets with charges spanning the range of all possible charges will fall on a curved line in the x-y plane, and the remainder of the x-y plane will be inaccessible. However, because Applicant teaches the variation of the electric field between the deflection plates, Applicant's invention can easily accommodate an additional dimension with an additional pair of deflection plates without losing the ability to deposit solder over the entire x-y plane. In essence, with Applicant's presently claimed method, the x-deflection is independent from the y-deflection, rather than having both deflections bound up with the charge on the droplet.

After carefully considering the cited prior art, the rejections, and the Examiner's comments, Applicant has thus amended claim 1 to reflect that the x and y deflections are dependent upon two distinct, variable electrostatic potentials. Turning to the three criteria of obviousness, Applicant respectfully submits that a *prima facie* case of obviousness cannot be established with respect to the claims as amended. First, not surprisingly there is no teaching or suggestion in Watts to extend the method of Watts to two dimensional deflection. Such a modification would result in almost complete loss of x and y range, as set forth above, violating the MPEP's requirement that "the proposed modification cannot render the prior art unsatisfactory for its intended purpose." [MPEP 2143.01] Applicant also respectfully submits that *the knowledge available to one skilled in the art* would also not recommend a second pair of deflection plates because, as set forth above, the practitioner would recognize the accompanying limitation in the x and y range.

Furthermore, there is no expectation of success. As outlined above, most of the x-y plane would be inaccessible. Moreover, if Watts were extended to two dimensional deflection as proposed in the Office Action, the extended reference fails to teach all elements of Applicant's claims. The separate elements "electrostatically deflecting said electrically charged stream of liquid solder metal droplets in a first variable electrostatic potential in said first dimension" and "electrostatically deflecting said electrically charged stream of liquid metal droplets in a second variable electrostatic potential in said second dimension" is not taught. For all of the above reasons Applicants respectfully submit that claim 1 is allowable, and claims 2 through 9 are allowable as depending from an allowable independent claim.

If it were to be argued that the "knowledge available to one skilled in the art" would lead one to simply add a pair of variable potential plates to the method of Watts, the combination would still not give Applicants invention for lack of teaching or suggesting that the first pair of plates is variable potential.

Obviousness Rejection Based on Watts, Jr. et al. (U.S. Patent 6,276,589), as applied to claim 3 above, and further in view of Nakasu et al. (U.S. Patent 6,213,356)

Claims 4 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Watts, Jr. et al. (U.S. Patent 6,276,589), as applied to claim 3 above, and further in view of Nakasu et al. (U.S. Patent 6,213,356). Applicant respectfully submits that the rejection is traversed with the arguments set forth above because the Nakasu et al. reference fails to teach or suggest the lack of teachings or suggestions in any combination of the cited prior art regarding the presently claimed invention.

Applicant submits that claims 1 through 9 are clearly allowable over the cited prior art for the reasons set forth above.

Applicant requests entry of this amendment for the following reasons:

The amendment is timely filed.

The amendment places the application in condition for allowance.

The amendment does not require any further search or consideration regarding the amended claims.

Applicant requests the entry of this amendment, the allowance of claims 1 through 9, and the case passed for issue.

Respectfully submitted,



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